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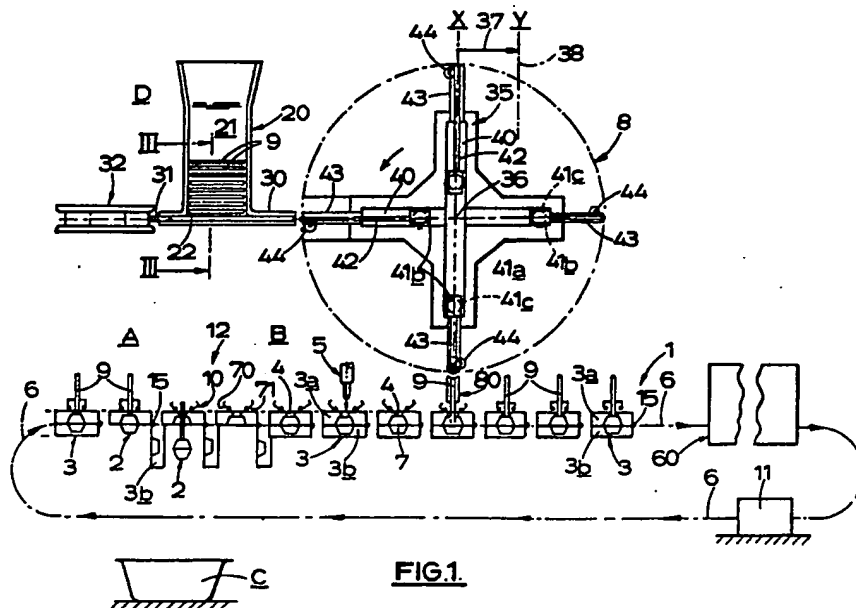
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**INT CL<sup>4</sup> A23G**

(54) **Apparatus for the manufacture of lollipops**

(57) As shown in Figure 1, apparatus 1 for manufacturing lollipops 2 comprises a plurality of two-part lollipop moulds 3 having upper entry openings 4, a liquid sugar confectionery depositing station 5, an endless chain conveyor 6 for transporting the moulds 3 in sequence beneath the depositing station 5, at which hot liquid sugar confectionery is dischargeable into the mould cavities 7 by way of the upper entry openings 4, a rotatable dispenser 35 for downward insertion of a stick 9 into the body of liquid present in each mould 3, and clamping flaps 70, 71 operable to retain the stick in position during solidification of the sugar.

The moulds 3 may be of metal and comprise upper and lower mould halves 3a, 3b pivotally connected to each other by hinges 15 operable to allow solidified lollipops to fall towards a collecting station C.



**FIG.1.**

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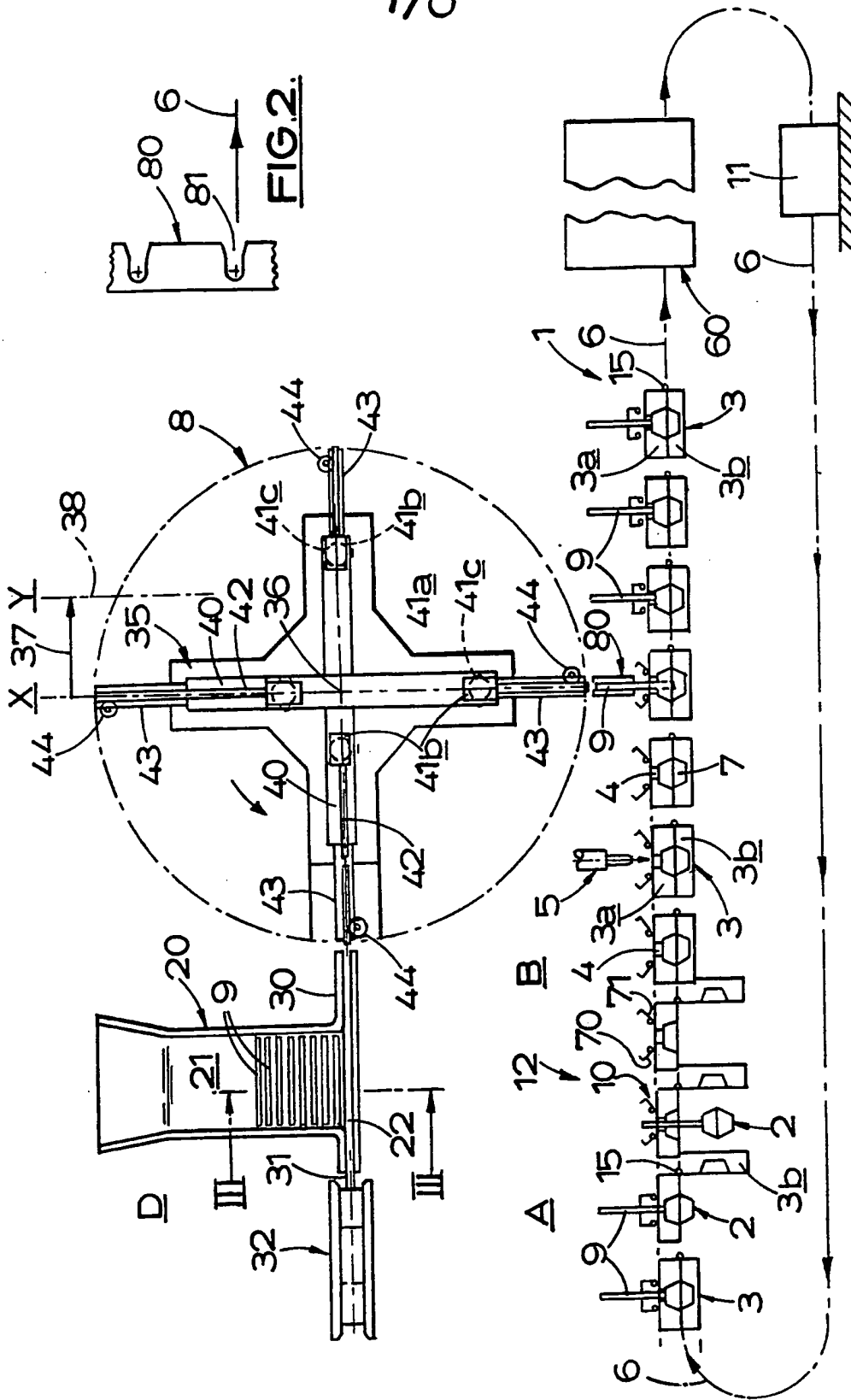
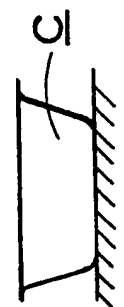


FIG. 1.



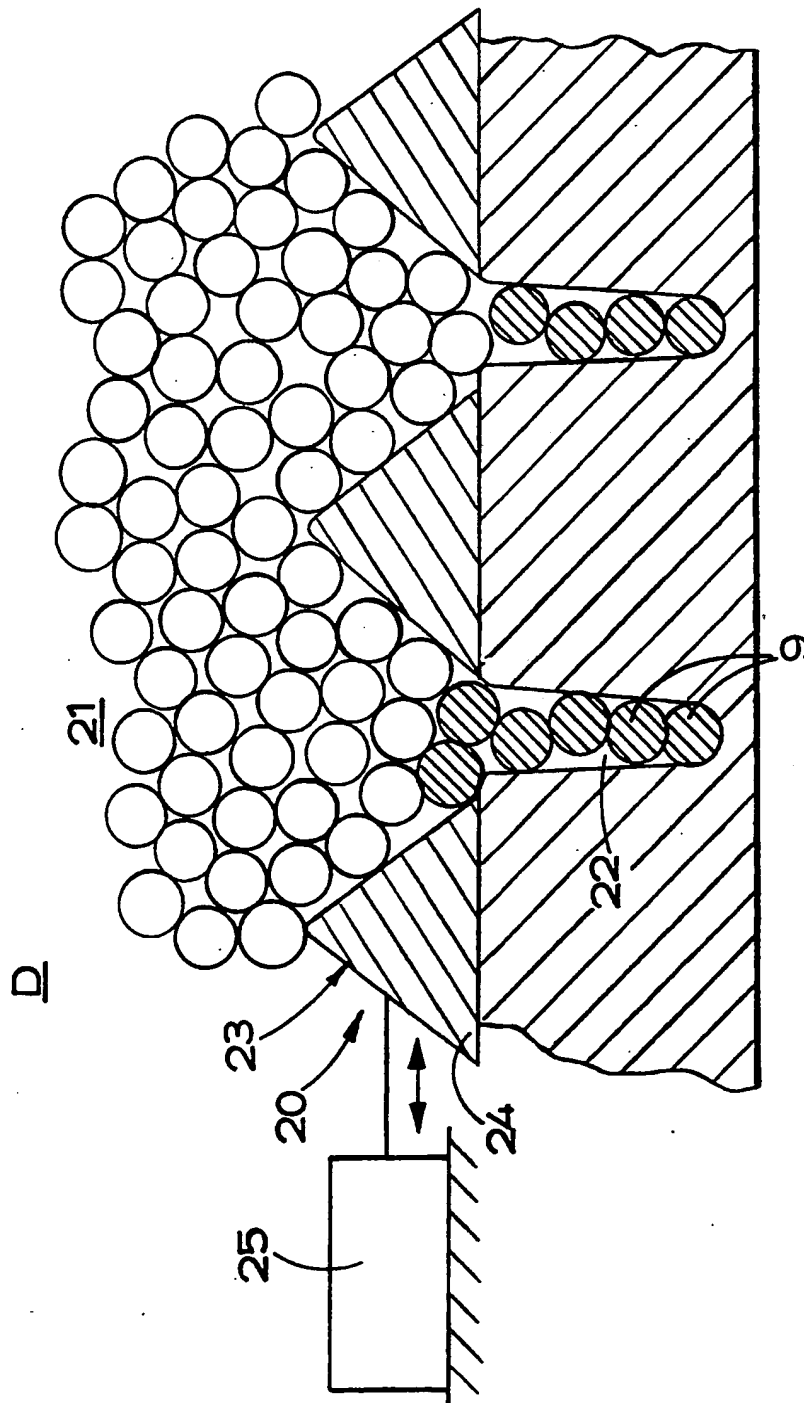


FIG. 3.

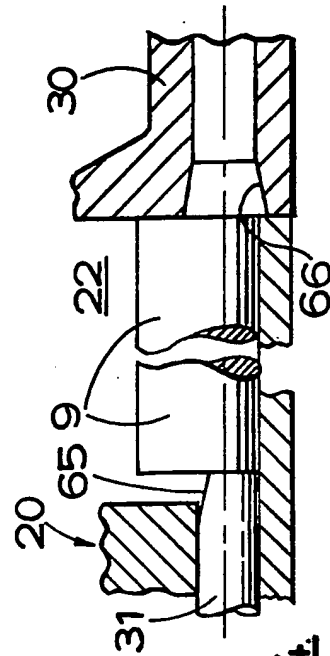
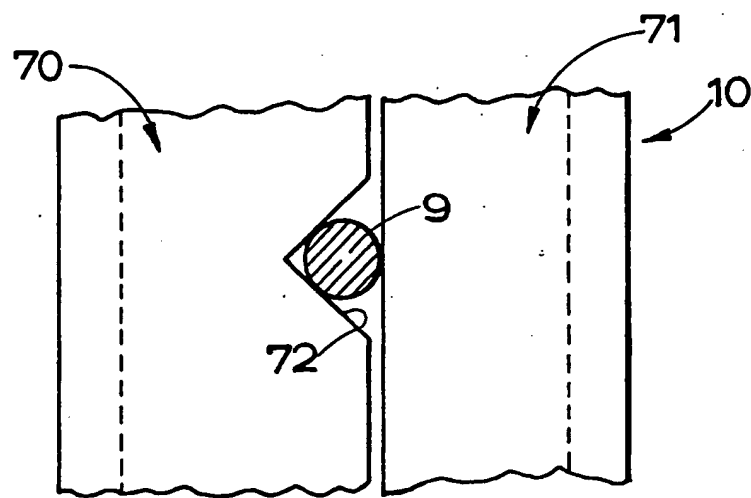
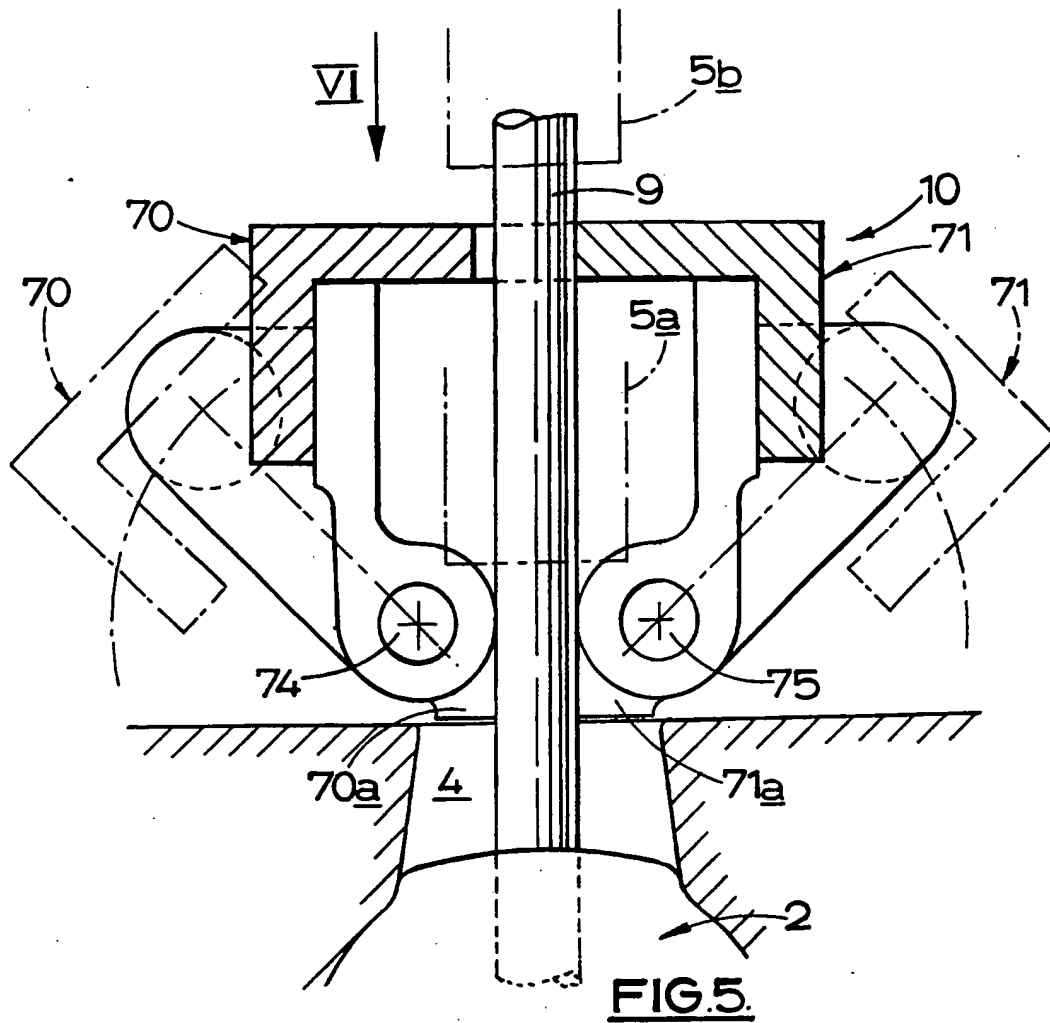
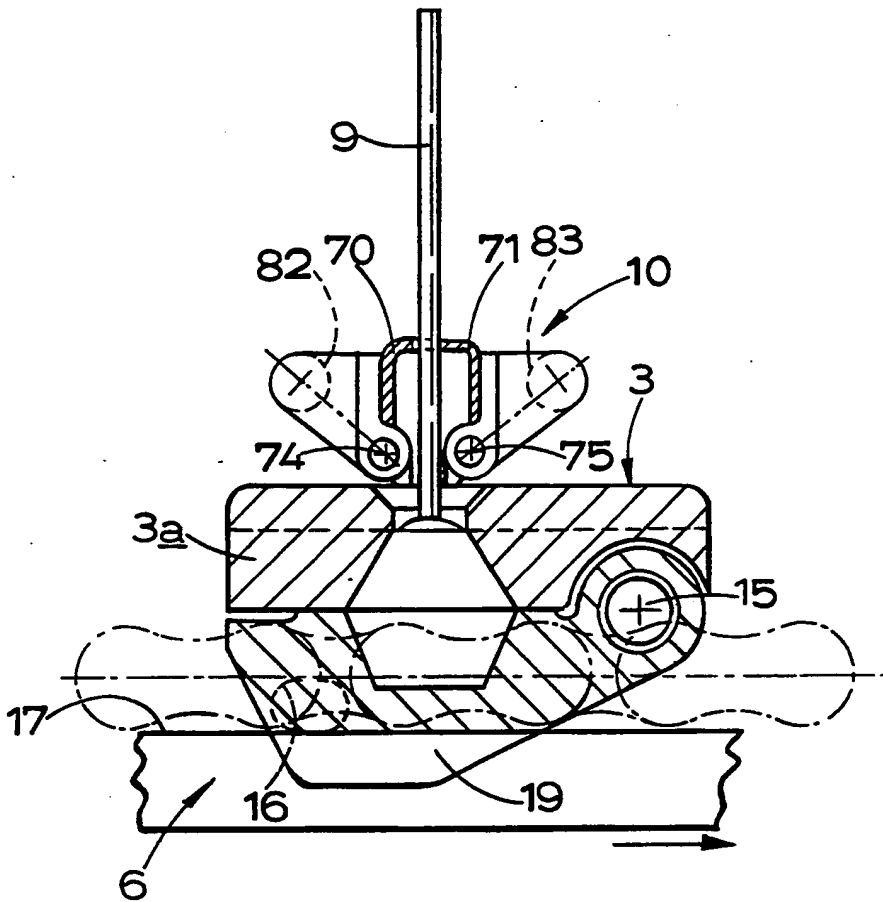


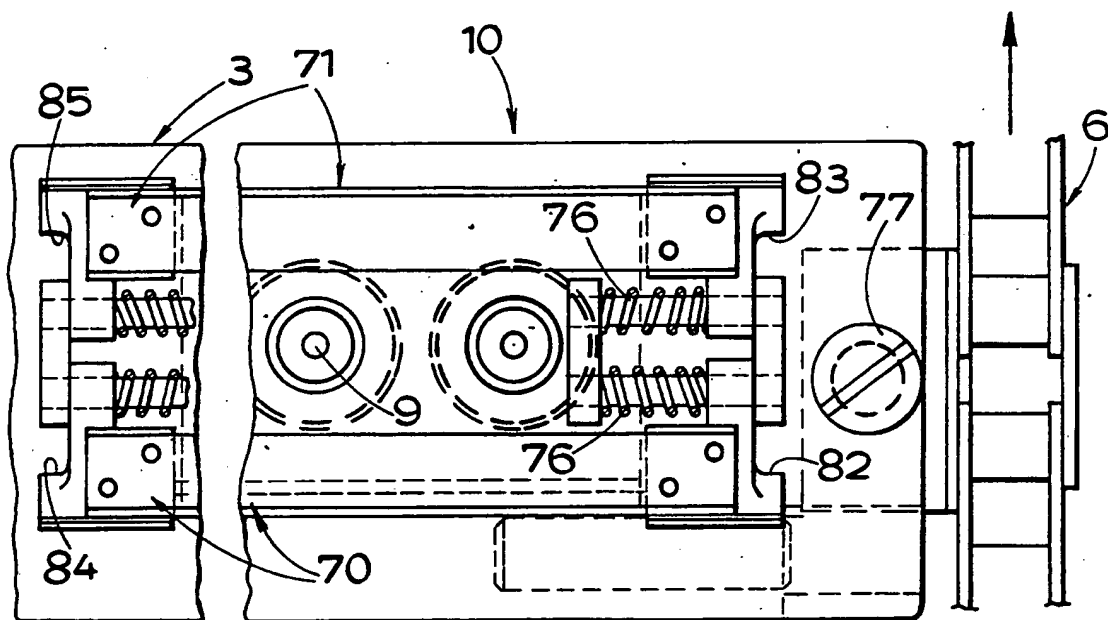
FIG. 4.



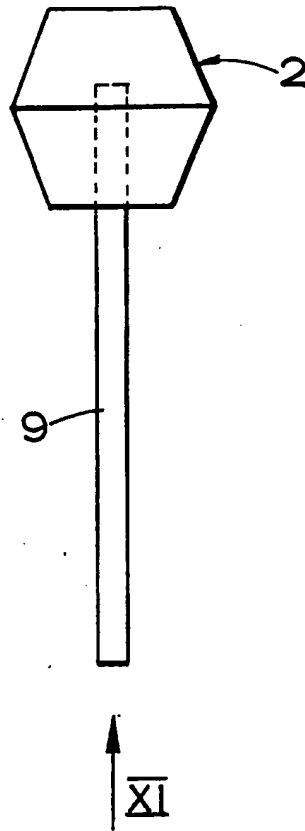
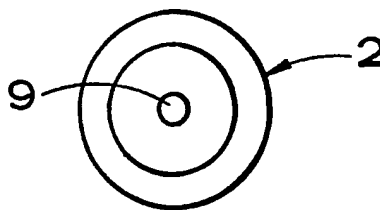


**FIG.7.**

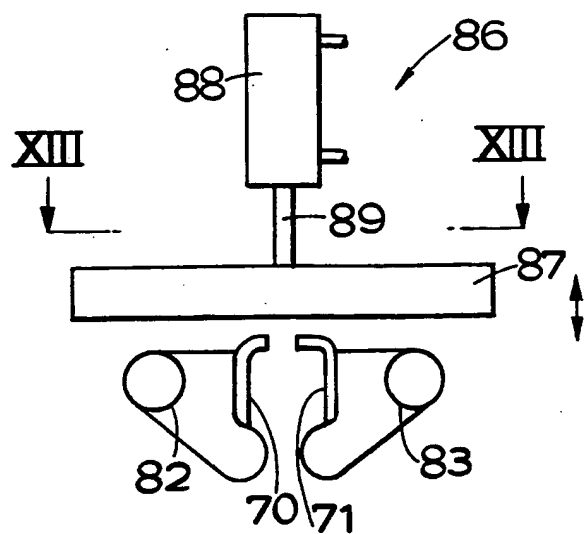
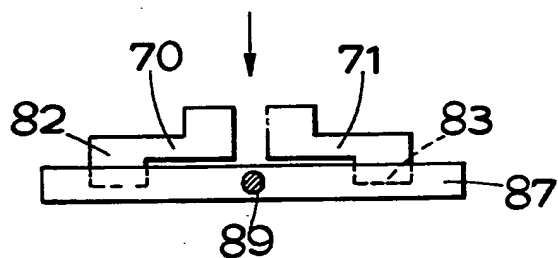
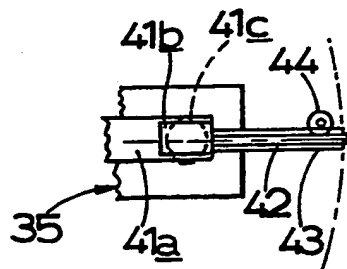


FIG. 9.

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FIG. 10.FIG. 11.



FIG. 12.FIG. 13.FIG. 14.

IMPROVEMENTS IN OR RELATING TO  
THE MANUFACTURE OF LOLLIPOPS

5     BACKGROUND TO THE INVENTION

This invention relates to the manufacture of lollipops, that is to say to candies or sweetmeats, made of sugar confectionery with fruit or other flavouring or fillings (hereinafter referred to collectively as "sugar confectionery"), mounted on sticks.

10

The present invention is particularly concerned with the use of deposited sugar confectionery for the manufacture of lollipops.

SUMMARY OF THE PRESENT INVENTION

15     According to the invention, apparatus for manufacturing lollipops comprises a plurality of lollipop moulds having upper entry openings, a liquid sugar confectionery depositing station, means for transporting the moulds in sequence beneath the depositing station, at which station liquid sugar confectionery is dischargeable into  
20     the mould cavities by way of the upper entry openings, means for downward insertion of a stick into the liquid present in each mould, and means operable to retain the stick in position during solidification of said liquid.

25     The means for stick insertion preferably comprises a dispenser rotatable about a substantially horizontal axis, and also movable substantially horizontally, in a direction normal to said axis, the dispenser being operable to receive a stick from a supply station, then to rotate until the stick is pointed downwards, to insert the  
30     stick into the entry opening of a mould, and to move laterally along with the mould as it is transported, until free of the stick.

BRIEF DESCRIPTION OF THE DRAWINGS

35     An embodiment of the invention will now be described by way of example only, with reference to the accompanying drawings, wherein:

Figure 1 is a side view of apparatus for manufacturing lollipops in a continuous manner,

5      Figure 2 is a plan view, to an enlarged scale, of a detail of Figure 1,

Figure 3 is a section, to an enlarged scale, taken on the lines III-III of Figure 1,

10      Figure 4 is a side view, in section, and to an enlarged scale, of a further detail of Figure 1,

Figure 5 is a side view, in section, of the means for retaining the sticks in position,

15      Figure 6 is a view taken in the direction of the arrow VI of Figure 5,

Figures 7 and 8 are side views (Figure 7 being in section) of a lollipop mould in two operative conditions,

20      Figure 9 is a plan view looking in the direction of arrow IX of Figure 8,

25      Figures 10 and 11 are side and inverted plan views of a lollipop manufactured by the apparatus of Figure 1,

Figure 12 is a side view of flap opening means,

30      Figure 13 is a fragmentary plan view, taken on the lines XIII-XIII of Figure 12 and

Figure 14 is a scrap view of another detail of Figure 1.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to Figure 1, apparatus 1 for manufacturing lollipops 2 comprises a plurality of two-part lollipop moulds 3 having upper entry openings 4, a liquid sugar confectionery depositing station 5, means comprising an endless chain conveyor 6 for transporting the moulds 3 in sequence beneath the depositing station 5, at which hot liquid sugar confectionery is dischargeable into the mould cavities 7 by way of the upper entry openings 4, means 8 for downward insertion of a handle or stick 9 into the body of liquid sugar confectionery present in each mould 3, and means 10 operable to retain the stick in position during solidification of the sugar.

The chain conveyor 6 is driven by drive means 11.

As shown by Figures 10 and 11, the form of a lollipop 2 comprises, in effect, a pair of frusto-conical shapes, disposed base-to-base.

The apparatus 1 illustrated is one of several disposed side by side, so that the juxtaposed apparatus together form a lollipop manufacturing machine 12.

As best shown in Figure 7 and 8, the moulds 3, which are of metal, comprise upper and lower mould halves 3a and 3b respectively, pivotally connected to each other by hinges 15. The lower mould halves 3b each carry a pair of lateral projections 16 which rest, in sliding contact, on stationary skids 17 which support the chain of the conveyor 6, so as to keep the hinged lower halves 3b in firm contact with their associated upper halves 3a. At conveyor station A (Figure 1) the skids 17 are no longer present and so, as illustrated by Figures 1 and 8, the lower mould halves 3b are free to pivot downwardly, under gravity, after a mechanical force has been applied to each of the projections 16. The mechanical force is applied by actuating means 26 (Figure 8) and causes unsticking of the mould halves, whereupon the lower halves 3b fall free, under gravity, away from the upper mould halves 3a and so open the moulds. At conveyor station B (Figure 1), the skids 17 are reintroduced with

lead-in portions (not shown) so that, on contact between the projections 16 and skids 17, the halves of each mould 3 are closed once again.

5       The actuating means 26 comprise a fixed cam surface 27.

As shown in Figures 7 and 8, the lower mould halves 3b have cooling fins 19 to dissipate heat. The cavities 7 of the metal moulds 3 may be coated with non-stick material.

10

With reference to both Figures 1 and 3, a common stick supply station D is provided for the lollipop sticks 9 used by the machine 12. The station D comprises a hopper 20 defining a storage chamber 21 with feed chambers 22 disposed beneath and separated from the storage chamber 21 by an anti-jamming structure in the form of a grid 23 (Figure 3 only) comprising laterally-spaced bars 24 of triangular cross-section. The grid 23 is movable to and fro, in a horizontal path by an oscillator 25. The oscillation prevents bridging or log-jamming of the sticks 9 so that they enter the feed chambers 22 unimpeded. One feed chamber 22 is provided for each of the apparatus 1.

As shown in Figure 1, the bottom stick 9 in a feed chamber 22 is ejectable, through a feed duct 30, by a plunger 31, movable to and fro by an oscillator 32. After ejection of a stick 9 from the chamber 22 and into the feed duct 30, the oscillator moves the plunger 31 back sufficiently to allow the next stick 9 to take the place of the one ejected.

30       The means 8 for insertion of a stick 9 into the body of liquid sugar confectionary recently deposited in a mould 3 comprises a carousel-like dispenser 35 of generally cruciform shape rotatable about a central axis 36 disposed substantially horizontally. The dispenser 35, which is common to the several apparatus 1 of the machine 12, is also movable substantially horizontally as indicated by the arrow 37, from the position shown in Figure 1 to one wherein

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the axis 36 is disposed in a vertical plane 38. In other words, from position X to position Y.

5 The dispenser 35 is rotatable in steps of 90°. Actuating means operable to rotate the dispenser 35 and to displace it horizontally, in a sequential manner, are not shown but are included in the drive means 11 of the chain conveyor 6. The conveyor 6 is common to the several apparatus 1 forming the machine 12.

10 The dispenser 35 further comprises two guide slots 40 disposed at right angles to each other and in line with the dispenser axis 36. Each orthogonal slot 40 slidably locates an actuating member in the form of a shuttle bar 41a, (see also Figure 14) which carries two rod holding bars 41b, one at each end. Rods 42 are held by the bars 15 41b, the rods 42 being slidably located by tubes 43 each of which carries a friction grip roller 44. The rollers 44 prevent movement of a lollipop stick 9 as the dispenser 35 is rotated about the axis 36.

20 The shuttle bars 41a, and thus the rod holding bars 41b, are controllably displaced in the guide slots 40, in sequence, by contact with cam rollers 41c operable by means (not shown) synchronously coupled to the conveyor drive means 11.

25 One shuttle bar 41a moves at right angles to and within the other in order to displace the rod holding bars 41b carried by the shuttle bars. The bars 41b and associated components comprise means for releasably retaining the sticks 9.

30 The upper run of the chain conveyor 6 does not follow a straight path. Instead, the conveyor track displaces the conveyor upwardly, momentarily, at the depositing station 5 and restores it to its original path thereafter. Part of the conveyor 6 passes through a cooler 60.

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As shown in Figure 4, the end of the plunger 31 which is used to displace a stick 9 into the feed duct 30 is formed with a downwardly tapered flat 65 so as to clear the stick 9 immediately above the stick actually being displaced from the chamber 22. The inlet end  
5 of the feed duct 30 is formed with a bell-mouth 66, to allow easy entry of a stick 9 into the duct.

With reference now to Figures 5 to 9, the means 10 operable to retain the sticks 9 in position during solidification of liquid  
10 sugar confectionery deposited in the moulds 3 are illustrated in further detail.

The means 10 comprise co-operating clamp members in the form of flaps 70, 71 which serve the several apparatus 1 forming the  
15 lollipop manufacturing machine 12. Flaps 70 have "V"-shaped notches 72 (Figure 6) formed in them at regular intervals which correspond to the pitch of the cavities of the moulds 3 disposed on the conveyor 6.

The flaps 70, 71 are pivotable about the central axes of hinge pins  
20 74, 75. The flaps 70, 71 are spring-loaded, by springs 76, so that they are biased towards the closed position shown in full lines in Figure 5, whereby the lollipop sticks 9 are located in the "V"-shaped notches 72 and are retained therein by the flaps 71.  
25 (See Figure 6.)

With reference to Figures 12 and 13, the pivotally-mounted, spring-loaded flaps 70, 71 of the stick retaining means are opened  
30 from the closed, ie stick retaining position, by activating means 86.

The actuating means 86 comprise a horizontally-disposed bar 87  
35 movable upwardly and downwardly in a controlled reciprocating manner by a fluid (air)-operated actuator 88, by way of a piston rod 89.

Reciprocal movement of the bar 87 is synchronised with lateral movement of the moulds 3 beneath, so that as the bar 87 is displaced downwardly, it pushes the lugs 82, 83 at the leading ends of a pair of flaps 70, 71 so as to cause the flaps to open against the action of springs 76.

The opened mould 3 continues its path, transported by the conveyor 6, whereupon lugs 84, 85 (Figure 9) at the trailing ends of the flaps 70, 71 engage in cam tracks (not shown). This engagement maintains the flaps open as the mould passes stations A, B and the stick insertion means 8, while the bar 87 of the actuating means 86, having been lifted clear of the mould, is returning on its downward stroke, so as to open the flaps 70, 71 of the next mould 3 in line.

After stick insertion, when the flaps 70, 71 of a mould are no longer required to be held open, the cam track engagement referred to above is terminated. This dis-engagement allows the springs 76 of the mould to take over and close the flaps 70, 71, whereby the engage the inserted stick.

The flaps 70, 71 have lower extensions 70a, 71a respectively which, when the flaps are closed, as shown in Figure 5, abut the upper surfaces of the mould halves 3a (ie the mould material surrounding the mould openings 4), so as to prevent the flaps from moving beyond the upright position shown in full lines.

As shown in Figure 9, the moulds 3 are demountably connected to the chain conveyor 6 by quick-release bolts 77.

Figure 9 also shows that a mould 3 has more than one cavity. This is because each mould 3 serves the several apparatus 1 forming the machine 12.

With reference to Figures 1 and 2, a stationary guide plate 80 is disposed above the chain conveyor 6. The guide plate 80 is formed with guide notches 81.



With reference to Figure 1, in operation, with a closed mould 3 at station B, the mould is transported by the conveyor chain 6 to beneath the depositing station 5 where the mould is raised as described above and a metered volume of hot liquid sugar confectionery is discharged into the mould cavity 7. (Figure 5 shows, in chain-dotted lines 5a, the position of the discharge nozzle of the station 5, relative to the mould 3 beneath, at the time of the sugar confectionery deposit, and in chain-dotted lines 5b, the position of the nozzle before the mould is lifted.)

10 The mould 3 is raised at the depositing station 5, so that the mould openings 4 are brought into close proximity with the nozzle of the station 5. The lifting action ensures accurate deposit of liquid discharged by the nozzle 5. Subsequent lowering of a mould assists in breaking any tail or thread of material extending between the nozzle 5 and liquid deposited in the mould cavity.

20 In a modification, more than one depositing nozzle may be employed per mould 3, whereby a multi-coloured or multi-flavoured lollipop can be produced.

25 The mould 3, with the liquid sugar confectionery deposited therein, moves on from that station 5 to beneath the bottom of the dispenser 35 which inserts a stick 9 into the deposit of liquid sugar confectionery. Immediately thereafter the flaps 70, 71 of the means 10 are triggered to close, whereby they hold the stick 9 in an upright position. The mould 3, with the sugar beginning to cool and thus solidify, then passes through the cooler 60, where heat is further extracted. The mould 3 then moves on to station A by which time solidification has been completed, and the stick 9 held firmly in place by this solidification.

35 At station A, the lower half 3b of the mould loses contact with the skids 17, (Figure 7) and the fixed cam surface 27 engages the projecting lug 16 mounted on the mould half, causing it to pivot downwardly whereby it is moved apart from the top mould half 3a, to

break open the mould 3. Gravitational forces cause the mould half 3b to open fully, pivoting through 90°.

5 Also at station A, the flaps 70, 71 of the stick retaining means 10 are opened by the actuating means 86 against their spring-loading. These actions release the lollipops 2 which now fall downwardly to be received by a collecting station C. A knocking arrangement (not shown) can be used to tap the sticks so as to help force the  
10 lollipops from their moulds 3.

Between stations A and B, the mould 3 is closed, ready for re-use. During transport of the mould 3 by the conveyor 6, the dispenser 35 operates in the following manner:

15 1. A stick 9 is inserted fully into the adjacent tube 43 by the plunger 31 of the hopper 20, where the stick is held in place by the associated grip roller 44. Associated rod 42 has been withdrawn, as shown in Figure 1, to allow this. Withdrawal of the rod 42 is  
20 caused by lateral movement of the associated shuttle bar 41a.

2. The dispenser 35 then rotates through 90° in an anti-clockwise direction until the stick 9 is pointing downwardly.

25 3. Next, the rod 42 above the stick 9 is displaced downwardly so that the stick first enters a notch 81 (Figure 2) of the guide plate 80, which aligns the stick, and then further downwardly, to enter the deposit of hot sugar confectionery held by the mould 3 positioned below.

30 4. Substantially at the same time, another stick 9 is being received by the dispenser 35.

35 5. The dispenser 35 is now displaced laterally, as indicated by arrow 37, so that full insertion of the stick 9 into the mould cavity can take place as the mould 3 is moving along.

6. As soon as the stick 9 has cleared the downwardly extending tube 43 of the dispenser 35, the dispenser is rotated a further 90° and, at the same time, the dispenser is moved back laterally, in a direction opposite to that indicated by arrow 37, whereupon the stick 9 just accepted by the dispenser is inserted into the next mould 3 in line.

7. The cycle is continued.

It will be appreciated that, in practice, several sticks 9 are handled simultaneously in the above described manner.

The invention allows use of liquid sugar confectionery in the manufacture of lollipops, while solving the problem of retaining the lollipop sticks in place after insertion into the hot liquid.

The invention also allows rapid, continuous production of the lollipops.

In a modification, the moulds 3 are not lifted upwardly towards the depositing station 5 when depositing takes place. Instead, the depositing nozzle is moved downwardly, towards the conveyor 6 and the moulds 3 thereon.

C L A I M S

1. Apparatus for manufacturing lollipops comprising a plurality of  
lollipop moulds having upper entry openings, a liquid sugar  
5 confectionery depositing station, means for transporting the moulds  
in sequence beneath the depositing station, at which station liquid  
sugar confectionery is dischargable into the mould cavities by way  
of the upper entry openings, means for downward insertion of a stick  
into the liquid present in each mould, and means operable to retain  
10 the stick in position during solidification of said liquid.

2. Apparatus as claimed in Claim 1, wherein the means for stick  
insertion comprises a dispenser rotatable about a substantially  
horizontal axis, and also movable substantially horizontally, in a  
15 direction normal to said axis, the dispenser being operable to  
receive a stick from a supply station, then to rotate until the  
stick is pointed downwardly, to insert the stick into the entry  
opening of a mould, and to move laterally along with the mould as it  
is transported, until free of the stick.

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3. Apparatus as claimed in Claim 2, wherein insertion of the stick  
into the entry opening of a mould continues as the mould is  
transported.

25

4. Apparatus as claimed in Claim 2 or 3, wherein the dispenser is  
rotatable in steps.

30

5. Apparatus as claimed in Claims 2, 3 or 4, wherein the dispenser  
comprises a pair of actuating members disposed at right angles to  
each other, and movable at right angles to each other, the ends of  
the actuating members being provided with means for releasably  
retaining a stick.

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6. Apparatus as claimed in any one of Claims 1 to 5, wherein each mould is of two-part form, one part being pivotally connected to the other part, and means for opening the mould and for closing the same, in a controlled manner.

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7. Apparatus as claimed in Claim 6, wherein the mould is maintained in a closed condition by contact of the mould with fixed structure during transportation, and is allowed to open, under gravity, by moving the mould out of contact with said fixed structure.

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8. Apparatus as claimed in any one of Claims 1 to 7, wherein the means operable to retain the stick in position during solidification of said liquid comprise a pair of stick clamp members, pivotally mounted so as to be movable towards and away from each other into and out of stick retaining positions.

15

9. Apparatus as claimed in Claim 8 wherein the clamp members are biased towards each other by spring means.

20

10. Apparatus as claimed in any one of Claims 2 to 9, wherein the stick supply station comprises a hopper for receiving sticks disposed horizontally, a feed chamber beneath the hopper for receiving sticks from the hopper and means for ejecting a stick from the feed chamber.

25

11. Apparatus as claimed in Claim 10, wherein an anti-jamming structure is disposed between the hopper and the feed chamber, the structure being moved to and fro along a horizontal path.

30

12. Apparatus for manufacturing lollipops, substantially as hereinbefore described, with reference to the accompanying drawings.

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